Please amend the application as follows:

Amendments to the Claims

Please amend Claims 1, 23 and 28. Please add new Claim 37. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently Amended) A method [[for]] as claimed in Claim 37 further comprising controlling [[a]] the process on a material, the controlling comprising:

~~disposing an electromagnetic field sensor proximate to a material that has at least one electrical property that varies with the process;~~

~~exposing the material to a process condition;~~

~~monitoring said electrical property with the electromagnetic sensor;~~

analyzing the electrical property; and

using the analyzed result to control the process.

2. (Original) The method as claimed in Claim 1 wherein the sensor is a magnetic field sensor.

3. (Original) The method as claimed in Claim 2 wherein the sensor is an eddy current sensor.

4. (Original) The method as claimed in Claim 2 wherein the sensor is an eddy current sensor array.

5. (Original) The method as claimed in Claim 2 wherein the sensor comprises a giant magnetoresistive sensor.

6. (Original) The method as claimed in Claim 1 wherein the sensor is an electric field sensor.

7. (Original) The method as claimed in Claim 1 wherein the sensor is mounted to a surface of the material.

8. (Original) The method as claimed in Claim 1 wherein the sensor is scanned over a surface of the material.

9. (Original) The method as claimed in Claim 1 wherein the electrical property is magnetic permeability.

10. (Original) The method as claimed in Claim 1 wherein the electrical property is electrical conductivity.

11. (Original) The method as claimed in Claim 1 wherein analyzing the electrical property further comprises:

comparing the monitored property with an estimated property.

12. (Original) The method as claimed in Claim 1 wherein the process is thermal treatment.

13. (Original) The method as claimed in Claim 12 further comprising:

monitoring temperature of the material.

14. (Original) The method as claimed in Claim 13 wherein analyzing the electrical property further comprises:

comparing the monitored property with an estimated property.

15. (Original) The method as claimed in Claim 1 further comprising:

exposing the sensor to the process condition of the material.

16. (Original) The method as claimed in Claim 1 further comprising:

exposing the sensor to a different process condition than the material.

17. (Original) The method as claimed in Claim 16 further comprising:

placing an intermediate material layer between the sensor and the material.

18. (Original) The method as claimed in Claim 1 further comprising:

monitoring at least one additional property.

19. (Original) The method as claimed in Claim 18 wherein the at least one additional property is sensor lift-off.

20. (Original) The method as claimed in Claim 1 further comprising:

measuring the property at multiple frequencies.

21. (Original) The method as claimed in Claim 1 wherein the process is fatigue.

22. (Original) The method as claimed in Claim 1 wherein the process condition is damage.

23. (Currently Amended) A method as claimed in Claim 37 further comprising [[for]] calibrating a sensor in-situ, said calibration comprising:

~~disposing an electromagnetic sensor proximate to a material;~~

~~exposing the material to a process condition, at least one electrical property varying with the process;~~

~~measuring sensor response; and~~

~~determining a calibration coefficient for the sensor response~~ using a known relationship between the process condition and the electrical property to determine a calibration coefficient that adjusts the sensor response to provide an electrical property value that corresponds to the process condition.

24. (Original) The method as claimed in Claim 23 wherein the sensor is an eddy current sensor.

25. (Original) The method as claimed in Claim 23 wherein the sensor is an eddy current sensor array.

26. (Original) The method as claimed in Claim 23 wherein the electrical property is electrical conductivity.

27. (Original) The method as claimed in Claim 23 wherein the process condition is a change in temperature of the material.

28. (Currently Amended) A method [[for]] as claimed in Claim 37 further comprising determining a relationship between a process ~~conditions~~ condition and an electrical property of a material, said ~~method~~ determination comprising:

~~disposing an electromagnetic sensor proximate to the material, the sensor measuring the electrical property of the material;~~

~~exposing the material to a process condition that affects the electrical property of the material;~~

measuring said electrical property for at least two different process conditions; and

using measured values to determine the relationship between the process condition and the electrical property.

29. (Original) The method as claimed in Claim 28 wherein the sensor is an eddy current sensor.

30. (Original) The method as claimed in Claim 28 wherein the sensor is an eddy current sensor array.

31. (Original) The method as claimed in Claim 28 wherein the electrical property is electrical conductivity.

32. (Original) The method as claimed in Claim 28 wherein the process comprises changing temperature of the material.

33. (Original) The method as claimed in Claim 32 wherein the electrical property is electrical conductivity.

34. (Original) The method as claimed in Claim 33 wherein the relationship between the temperature and the conductivity is linear.

35. (Original) The method as claimed in Claim 32 wherein measurements used to determine the relationship are performed during an initial heating transient.

36. (Original) The method as claimed in Claim 32 further comprising:

controlling the process to minimize divergence of a measured property from a property estimated from said relationship.

37. (New) A method for calibrating a sensor for use in process control, said method comprising:

disposing an electromagnetic field sensor proximate to a material that has at least one electrical property that varies with a process condition, the electromagnetic sensor being sensitive to the at least one electrical property;

disposing a material state sensor proximate to a test material, the material state sensor using a non-electromagnetic sensing method;

measuring the material state sensor at two or more different states to calibrate the electromagnetic field sensor response based on a relationship between the process condition and the material state, the calibrated sensor response being used as an input to a process controller; and

monitoring the relationship between the process condition and the material state to detect changes in the relationship caused by the process, said changes in the relationship being input to a process controller.